Government of Bengal

Public Health Department

(Engineering Branch)

Twenty-eighth

Annual Report of the Chief Engineer Public Health Department, Bengal

For the year ending December 1940

Price—Indian, annas 8; English, 10d.

ISSUE SLIP

Date of Issue	Issue Number	Date of Issue	Issue Number

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Superintendent, Government Printing
Bengal Government Press, Alipore, Bengal
1941

Published by the Superintendent, Government Printing
Bengal Government Press, Alipore, Bengal

Agents in India.

Messrs. S. K. Lahiri & Co., Ltd., Printers and Booksellers, College Street, Calcutta.

Messrs. Thacker, Spink & Co., Calcutta.

Customers in the United Kingdom and the Continent of Europe
may obtain publications either direct from the High Commissioner's office
or through any bookseller.

Twenty-eighth Annual Report of the Chief Engineer, Public Health Department, Bengal, 1940.

1. **Establishment.**—I was on leave from 1st September 1940 to 4th October 1940 and Mr. W. J. Berry, F.S.I., A.M.I.C.E., M.I.E. (Ind.), Executive Engineer, Central Division, officiated for me. He was in charge of the Central Division throughout the year except for the above period.

Rai S. N. Roy Bahadur, B.E., A.M.I.E. (Ind.), held charge of the Dacca Division throughout the year.

Mr. M. Hossain, A.M.I.E. (Ind.), was appointed Executive Engineer, Western Division, on 1st June 1940 and he held charge of this Division till the end of the year.

Mr. A. K. Banerji, B.SC., B.E., A.M.I.E. (Ind.), Assistant Engineer officiated as Executive Engineer, Western Division, from 1st January 1940 to 31st May 1940. He was on leave for three months from 1st June 1940 to 31st August 1940 and then officiated as Executive Engineer, Central Division, from 1st September 1940 to 4th October 1940; he was again on leave for three days from 17th October 1940 to 19th October 1940.

Mr. S. C. Ghose, A.M.I.Mech. E., M.R. SAN.I., A.M.I.E., (Ind.), Assistant Engineer, Mechanical, was on duty throughout the year.

Mr. B. R. Bhattacherji, A.M.I.E. (Ind.), officiated as Assistant Engineer in place of Mr. A. K. Banerji from 1st January 1940 to 4th October 1940.

Mr. A. Latif, B.E., Assistant Engineer, Dacca City Subdivision, was on leave from 18th March 1940 to 21st March 1940 and again from 17th October 1940 to 7th November 1940. Mr. B. R. Bhattacherji officiated as Assistant Engineer in place of Mr. A. Latif during the latter period.

Mr. S. N. Das, B.SC., A.M.I.E. (Ind.), Assistant Engineer, Rural Water-supply Subdivision, was on leave from 12th August 1940 to 24th August 1940 and again from 16th December 1940 to 23rd December 1940.

The strength of the subordinate engineering establishment at the close of the year was as follows:—

	Permanent.	Temporary.	Total.
Assistant Engineer ..	3	8	11
Supervisors ..	0	8	8
Overseers ..	0	3	3
Sub-overseers ..	0	3	3
Supdt. of waterworks ..	1	1	2

2. **Schemes prepared.**—The following schemes were drawn up during the year under review:—

Sketch projects.

(a) Water-supply.

	Estimated cost
	Rs.
(*i*) Sakuni Water-supply—	
This scheme provided for the supply of water to the new subdivisional headquarters. The source of supply was to be the lake from which the water was to be pumped to an elevated settling tank and after filtration through a pressure filter it was to be distributed through a pipe reticulation of a suitable dimension which would feed street tanks located at convenient places along the roads ...	43,900
(*ii*) Pirojpur Waterworks Improvement Scheme (second revised sketch project)—	
This scheme provided for the supply of water from a deep tube-well. Provision was made in the estimate for an iron removal plant to be installed at a later date if the iron content of the water yielded by the well increased as a result of prolonged pumping. The distribution system was generally on the lines of the previous scheme, but less elaborate ...	77,500
(*iii*) Kalna Water-supply Improvement—	
Early in 1934, the municipal commissioners installed their water-works with tube-wells as the sources of supply. The scheme as executed did not pass through the usual channels according to standing rules and was not forwarded to this department for approval. Subsequently under instructions from the Government, the municipality requested this department to prepare a comprehensive water-supply scheme utilising the existing tube-wells. Two alternative schemes A and B were prepared, and submitted to the municipality in January 1940. The scheme B was approved by the municipal commissioners, but they wanted to complete a partial scheme on the line within their financial limit. Accordingly scheme "C" was prepared and forwarded to the municipality.	
Scheme A.—Provided for a daily supply of 80,000 gallons with allowance for house connections but no extension of pipe lines to other parts of the town ...	48,000
Scheme B.—Same as "A" above; but included extension of distribution system to other parts of the town ...	86,500
Scheme C.—This was a modification of scheme A admitting future extension of distribution system so far as included in scheme "B" ...	52,000
(*iv*) Asansol Mining Settlement—	
The problem of shortage of water-supply and increase of malaria within the jurisdiction of Asansol Mining Board of Health was represented by Messrs. B. Mondol and A. K. Maijhi, M.L.As. before His Excellency the Governor during his visit to Burdwan in 1938. This problem was investigated by the Subdivisional Officer, Asansol and the District Magistrate of Burdwan, and their report was forwarded to the Director of Public Health and the Chief Engineer, Public Health Department, for an expression of opinion. The present scheme with its report, which gives an elaborate treatment of the problem of Water-supply Improvement of the locality, has been drawn up in consultation with the Director of Public Health after securing as much information and enquiries as possible. The water-supply of the area will be completed in 17 independent units and will depend on colliery water as the source of supply. The scheme has been roughly estimated to cost ...	9,59,600

	Estimated cost Rs.
(*v*) Ziaganj-Azimganj Water-supply—	
The Chairman of the Ziaganj-Azimganj municipality in his letter No. 315 J.A.M., dated 29th January 1939, requested this department to prepare a sketch project for the municipality with Bhagirathi river as the source of supply.	
As the river completely separates the two areas Ziaganj and Azimganj, it has been necessary to provide each of them with a separate independent unit.	
(*1*) *Ziaganj Area.*—The scheme for this area provides for daily supply of 60,000 gallons to serve a population of 9,000 souls allowing future increase.	
The estimated cost of the scheme is ...	1,74,000
(*2*) *Azimganj area.*—The scheme for this area provides for a daily supply of 27,000 gallons to serve a population of 3,500 souls allowing the usual future increase.	
The estimated cost of the scheme is ...	1,10,000
The total annual maintenance cost of the scheme for the two units would be Rs. 12,000 approximately.	
(*vi*) Improvement to the water-supply system of the Police Lines at Bankura—	
A scheme for independent water-supply systêm, providing supply for 150 souls through 5 street tanks and 5 house connections utilising one of the two existing 5″ dia. tube-wells in the bed of Darakeswar river as a source ...	20,000
(*vii*) Raniganj Water-Supply Improvement Scheme—	
An improvement scheme providing for filtration arrangement at the present head-works with addition of low lift pumping sets	74,600
(*viii*) Bally Water-supply Scheme—	
Alternative schemes on centralised and decentralised storage system of supply prepared for comparative study of merits and demerits of the two different systems, for the consideration of the Sanitary Board.	
Scheme A—Centralised sthorage system ...	5,76,500
Scheme B—Decentralised storage system ...	5,00,000
(*ix*) Dacca Waterworks Improvement V—	
It was a scheme for the augmentation of the supply of filtered water in the Purana Paltan and Nawabpur areas of the town, where the pressure of water in the mains was not only low, but the supply was also inadequate. Water would be drawn from two 5″ tube-wells to be sunk near the Britannia cinema hall and would be forced into the distribution mains after chlorination only, at the rate of 10,000 gallons per hour during supply hours.	
The arrangement would not only improve the supply in the Purana Paltan and Nawabpur areas but it would also ensure satisfactory supply within the Government House and in the school, college and hostels for Girls at Ramna ...	48,800
(*x*) Barabakunda Mela Water-supply Scheme—	
The scheme was for the supply of drinking water to the pilgrims who congregated during Sivaratri festival in the shrine of Barabakunda in the district of Chittagong.	

Estimated cost
Rs.

As there was no satisfactory source of supply near at hand, an arrangement was originally made by the Mela Authorities to obtain the supply by gravitating water from a hill stream higher up. This did not work well.

Moreover, the area being within the Volcanic Zone, supply from tube-wells was not considered feasible.

Supply was proposed to be obtained by pumping at 7,500 gallons per hour from a tank lower down the place and the supply distributed through five 400 gallons street tanks after chlorination ... 12,840

(*xi*) Mymensingh Water-supply Improvement IIA—

The scheme was for the augmentation of supply to the town to full capacity of the headworks which was capable of treating and distributing about 6 lac gallons of water a day. It provided for an additional storage in an elevated tank of 50,000 gallons capacity which was to be built near the Police Club. The scheme included a rising main to feed the service reservoir and also certain other minor works ... 52,500

(*xii*) Mymensingh Waterworks Improvement II-B—Additional Distribution Mains—

The scheme aimed at improving the pressure in the water mains by replacing certain of the existing mains by bigger ones. It also provided for extension of pipe line to the areas hitherto unprovided with water pipes ... 26,700

(*xiii*) Narayanganj West Bank Water-supply Improvement Scheme—

Repairs to the existing filter wash water tank and laying of distribution mains in Hajiganj area for isolation of rising main.

The scheme provided for repairs to the filter wash water tank within the waterworks compound and for isolation of the rising main by disconnecting the distribution mains from the same ... 12,430

(*xiv*) Scheme for the remodelling of the Chittagong Waterworks—

It was a scheme for the increase of supply of drinking water in the town to 9 lac gallons a day by sinking additional tube-wells, installation of pumping machinery on electric drive and construction of an additional service reservoir exclusively for the low level zone of the town. The sketch project was prepared in 1936 and was estimated to cost Rs. 3,99,000.

The Sanitary Board, wanted to include in the scheme certain improvements in the drainage system in the town so that no waste water due to the waterworks could stagnate anywhere.

Two supplementary estimates were, therefore, prepared, viz., (1) a modest scheme to provide just a few essential drains with pucca inverts and (2), a more ambitious one, with provision to make drains in the congestion part of the town pucca.

Estimate I. .. 56.000

Estimate II. .. 1,00,000

(*b*) *Drainage and sewerage Schemes.*

(*xv*) Bhatpara Improvement Scheme (Extension)—

A scheme for the construction of 8 additional hand dumping depots and a combined hand dumping depot and public latrine together with sewer connections ... 13,300

Estimated cost
Rs.

(*xvi*) Halisahar Sewerage Scheme—Revised Sketch Project—

This scheme was drawn up to serve a population of about 25,000 in Ward I of the municipal area. The night-soil from the population of approximate 4,000 in the other three wards could, however, be disposed of by dumping at a cart dumping depot to be constructed at the northern extremity of ward I. The sewer system was to be so designed that the latrines at the Naihati Hukum Chand Jute Mills could, after conversion to the water-carriage system, be connected to it. The cost of such conversion was not, however, included in the estimate. The sewer reticulation was to be so arranged that the several sewers would discharge by gravity into a receiving well constructed at a fairly central point whence the sewage would be pumped to the disposal works. Gulley pits were to be provided at suitable positions to pick up the dry weather flow in the surface drains and discharge the sullage into the sewers. These gulley pits were to be of such design as to exclude automatically from the sewers all rain-water in excess of a predetermined quantity and by-pass it to the ordinary surface channels ... 4,06,000

(*xvii*) Debhatta Drainage Scheme—

Owing to construction of a bund across the Gopakhali khal by the local zemindárs drainage difficulties were being experienced. On investigation it was found that the sluice culvert constructed in the bund was of insufficient capacity. It was, therefore, proposed to construct a new sluice culvert with a greater waterway and also to regrade the existing drains and provide pipe culverts at suitable places ... 9,200

(*xviii*) Sewer along the southern portion of chord road at Bhatpara—

The Calcutta Electric Supply Corporation having constructed a large power-station with staff quarters near the southern extremity of Bhatpara municipality, the municipal commissioners of Bhatpara wanted to have an estimate prepared by this department for constructing a sewer to connect the power-station premises with the existing sewerage system of Bhatpara, so that it might be possible for them to impose the full conservancy rate on that holding and thereby repay within a few years the capital cost involved ... 1,03,400

(*xix*) Surface drain from old Calcutta road to the E. B. Railway main line at Tittaghur. ... 73,600

(*xx*) Surface drain from the E. B. Railway line to the River Hooghly—

When the Tittaghur drainage scheme was before the Sanitary Board for consideration, a point was raised as to whether the scheme put forward by the Public Health Department would benefit the rural area at the summit of the drain. The Board appointed a sub-committee to investigate the matter and to submit a report for consideration by the Board before it recommended the Tittaghur khal scheme to Government for sanction.

The Irrigation Department was consulted and the above two estimates were prepared on the basis of their recommendations. These were considered by the sub-committee who were of the opinion that a very small portion of the rural area would be benefitted, that the cost of obtaining such improvement by widening the scope of the Tittaghur khal scheme would be excessive and that the execution of that very important scheme, which had been under consideration and negotiation several years, would be deferred for an indefinite period. The Sub-Committee, therefore, recommended that the Tittaghur khal scheme, as prepared by the Public Health Department, be approved by the Board and that Government be asked to sanction it at an early date. A further recommendation was made that the rural area be dealt with by the Irrigation Department as part of another scheme then under consideration by that department ... 2,92,900

	Estimated cost
	Rs.
(*xxi*) Rajshahi Drainage Improvement Scheme—	
This was the third revised sketch project. The municipal commissioners having installed a pump at the thana Cess pool, to pump the sullage accumulated therein, since the 2nd sketch project was drawn up, it became necessary to revise the scheme again and to incorporate this small plant into the main scheme so that the money already spent on it might not to be wasted ...	68,400
(*xxii*) Comilla Drainage Scheme—	
It was a scheme to make the more important surface drains in the town *pucca* or to provide them with pucca inverts, and, also to intercept all such drains at their outfalls into underground drains. The scheme also provided for a number of dumping chutes for the disposal of night-soil by dumping into the sewers.	
The sullage and the night-soil would gravitate into a receiving well, from where the sewage would be delivered into the treatment area by pumping for digestion in a series of earthen tanks. The final effluent would be disposed of by being used for irrigation ...	3,16,250

Detailed Projects.

(1) Tittaghur khal improvement—	
This scheme was drawn up on the lines of the sanctioned sketch project.	
The western portion of the khal from E. B. Railway to the Hooghly was to be made pucca and roofed over. The eastern portion of the khal from the railway to the old Calcutta Road was also to be made pucca but not covered. The portion to the east of the Old Calcutta Road was to be regraded only. ...	1,13,600
(2) Tollygunge Flood Prevention Scheme—	
To minimise flooding in the lower portions of the municipal area it had been suggested that those localities should be isolated by constructing bunds around them and provision made for draining out any accumulated water as and when opportunity arose.	
Detailed investigations shewed that while some relief would be obtained when the storm-water channel of the Calcutta Corporation was put into commission, it was evident that pumping would have to be resorted to during the time of the heaviest rainfall. It would also be necessary to discharge the sullage from the municipal surface drains into the Calcutta sewage outfall channel during the dry season. Furthermore, it became evident that a considerable amount of internal drainage would be necessary in the reclaimed area if an epidemic of malaria was to be avoided ...	3,88,970
(3) Garulia Surface Drainage Scheme—	
A detailed project following closely on the lines of the sanctioned sketch project was prepared and sent to the municipality ...	27,900
(4) Serampore Water-supply Extension—Completion scheme (final)—	
This was a revision of the detailed project prepared by this department in September 1939 ...	72,300
(5) Asansol Sewerage Scheme—	
Repairs to main drain side slope on 21" sewer at outfall works and subsequently for protection of main sewer ...	1,130

	Estimated cost
	Rs.
(6) Dumping septic tank latrine for Burdwan municipality—	
Detailed plans and estimates for dumping septic tank latrines within the town for disposal of nightsoil ...	6,390
(7) Narayanganj West Bank Water-supply Improvement Scheme—Repairs to the existing filter wash tank—	
A sketch project estimated to cost Rs. 12,430 was prepared for repairs to the filter wash tank and for isolation of the rising main by disconnecting distribution mains from it. The municipal commissioners decided to take up the repairs of the filter wash tank alone at the first instance. The scheme provided for replacing the bottom of the tank and renewing its roof, and certain other minor work ...	3,450
(8) Eden H. E. School, College and Hostel for Girls—Sanitation Scheme—(Water-supply portion)—	
Due to the very low pressure in the adjoining municipal water mains it was decided to arrange for independent supply to these buildings with a tube-well as the source of supply.	
The quality of tube-well water in the area was quite good and was fit to be distributed for use without any treatment. The water would be pumped from the tube-well by a set of electric motor pumps and delivered into the storage tanks on the roof of the various buildings after chlorination. From the roof tanks the water would gravitate to the various units.	
A daily supply of 15,000 gallons was contemplated ...	15,700
(9) Munshiganj Water-supply Scheme—(Revised Estimate)—	
The original scheme for this work was on the basis of a tube-well as the source of supply, and was estimated to cost Rs. 56,700. When the work was about to be started in 1939, the people of Munshiganj decided in a meeting that the supply should be obtained from the river. The scheme was, therefore, recast. It was estimated to cost Rs. 85,900.	
The cost of materials having gone up since, the estimate was revised during the year under review on the basis of the current prices of materials and labour.	
The cost of the revised scheme on the basis of the revised estimate was ...	94,500
(10) Eden H. E. School, College and Hostel for Girls at Ramna, Dacca—Sanitation Scheme (Sewerage portion)—	
The scheme included the underground drainage portion of the sanitary arrangements of the above premises and was prepared for the Communications and Works Department.	
The system consisted of shallow Hume pipe underground drains sloping towards a sump. All sullage and sewage accumulated therein were to be delivered into the adjoining summit manhole of the Dacca University sewers by pumping with a set of motor-driven non-chokable centrifugal pumps ...	41,300
(11) Mymensingh Drainage Scheme—	
The details were on the same lines as the sketch project prepared in 1938, with minor modifications.	
More important kutcha drains within the town would be made pucca or provided with pucca inverts.	

	Estimated cost
	Rs.
The sullage from these surface drains would be intercepted into a system of sewers through gulley pits on these drains which would be on the outskirts of the town and carried to a sump from where it would be pumped by a set of motor pumps into the treatment area situated in the fields outside the town.	
The system of sewers included in the scheme would form the outfall sewers of the final sewerage scheme, to which all branch sewers would be connected as and when built. These outfall drains would be laid at such levels as would permit the sewer system to be extended to most parts of the town.	
The treatment would consist of digestion of the sullage mixed with night-soil in a series of earthen tanks. The effluent would be finally disposed of by discharging it into the Beel Area.	
Night-soil would be disposed of by dumping into the sewer through a chute to be constructed within the existing Metharpara ...	2,50,000
(12) South Chandpur New Waterworks—	
The sanctioned estimate was on the basis of machinery on oil engine drive and with the site of the headwork on the river bank. The site was later on changed to provide for anti-salinity measures and it was decided to instal machinery on electric drive.	
The scheme was, therefore, recast and the estimate was revised. The estimated cost of the revised scheme was ...	1,58,449

Miscellaneous.

Estimates were prepared for the following:—

(1) Serampore Water-supply extension—Completion Scheme ...	32,000
(2) Bally Drainage (outfall drain through Lillooah union board) ...	40,000
(3) Improvement of Water-supply system for the Police line at Bankura	16,700
(4) Serampore sewerage scheme—	
(*i*) Additional works for improvement of Chatra ward with subsidiary pumping station in night-soil depots ...	22,100
(*ii*) Additional alternative proposal with the common outfall drain with Baidyabati municipality having to be abandoned and subsidiary pumping station at Chakravarty Lane ...	22,500
(5) Suri Waterworks—	
Installation of filtration arrangement ...	53,700
(6) Baranagar-Kamarhati Water-supply Scheme—	
Fencing round the lake ...	8,350
(7) Rajshahi Water-supply Scheme—	
Remodelling of the washwater drain from the iron eliminator ...	1,800
(8) Ganga Sagar Mela Water-supply— ...	3,375
(9) Kalimpong Water-supply Maintenance Works ...	4,500
(10) Kalimpong Waterworks Extension—	
Distribution system to the Development area ...	1,690

	Estimated cost
	Rs.
(11) Maintenance of Baranagar-Kamarhati waterworks ...	22,039
(12) Bhola Water-supply Scheme—	
A scheme for temporary water-supply from the new deep tube-well, sunk by the department during the year ...	2,200
(13) Quarters for the staff of the Maijdi drainage and waterworks—	
An estimate was prepared for the staff quarters ...	6,800
(14) At the request of the Burdwan Municipality a scheme for dumping septic tank latrine was prepared and sent ...	6,390
(15) At the request of the Bhatpara municipality an estimate of cost of a hand dumping depot and public latrine at the junction of the Station Road and Gopi Kisson Road, Bhatpara, was sent to the municipality—Estimate ...	3,000
(16) At the request of the Superintendent, Alipore Central Jail, plans and estimates for conversion of a 12-seated trough latrine in the undertrial ward of Alipore Central Jail into sanitary latrines of improved type were prepared and forwarded to him.	
Estimate I ..	3,000
Estimate II ..	2,400

3. The total estimated costs of schemes prepared were as follows:—

	Rs.
(1) Sketch projects—	
(*a*) Water-supply ...	30,31,870
(*b*) Drainage and sewerage ...	12,83,050
(2) Detailed projects—	
(*a*) Water-supply ...	3,44,399
(*b*) Drainage and sewerage ...	8,29,290
(3) Miscellaneous ...	2,52,544

4. Schemes examined.

(1) The scheme prepared by the Executive Engineer, Damodar Canal Division, for the construction of a septic tank and latrines in the office compound at Burdwan was examined.

(2) At the instance of the Executive Engineer, City Division (Communications and Works Department), the design for installation of a 5″ diameter tube-well in the compound of the Medical College Hospital, Calcutta, was examined and advice for its improvement given.

(3) At the request of the Executive Engineer, Burdwan Division, the proposal for resinking the tube-well in the sub-jail compound at Rampurhat on another site was examined and necessary improvements suggested.

(4) At the request of the Commissioner of Police, Calcutta, the design for installation of a septic tank and soak well at the Indian Territorial Force Headquarters on the Calcutta Maidan was examined and modifications suggested.

(5) Under instructions from Government, the proposal for re-excavation of a thana tank in the compound of Banaripara police-station in the district of Bakarganj and for removing the defect in the existing tube-well, was examined, and advice was given to sink a trial boring and, if the water is found suitable, to insert a tube-well.

5. **Works executed under the supervision and control of this department.**—(1) *Bhola water-supply scheme (Revised).*—The Sanitary Board having decided that an alternative scheme should be prepared with a tube-well as the source of supply and allowance made for the treatment of the water, if necessary, a trial boring was sunk and boring operations were continued to a depth of 990 ft., the quality and yield of water at various depths being tested as the boring proceeded. The best conditions were found at a depth of 886 ft., the water being satisfactory both as regards quality and quantity. A 3″ tube-well was, therefore, installed. A scheme to supply the town from a tube-well was prepared and provision was made for the installation of an iron elimination plant should the iron content of the water show any appreciable increase after regular pumping had continued for a few months.

(2) *Garden Reach Water-supply.*—The laying of the distribution system was much advanced and the work was in progress.

The overhead pressed steel tank at the proposed pumping station, which had stood empty for a number of years, was filled and tested for watertightness. As it was found to leak badly, arrangements were made to have it dismantled and re-erected, and this was in progress at the close of the year.

A contract was let for the electrically-operated pumping plant and an automatically controlled gaseous chlorinator.

(3) *Bhatpara Improvement Scheme (Extension).*—The water-supply was in process of being changed over to the decentralised-storage system of supply. For this purpose street tanks were constructed at suitable places selected by the municipal commissioners and the street stand-posts were gradually removed. Work was still in progress at the end of the year.

(4) *Pakhimara Bheel Drainage scheme.*—Land acquisition proceedings for the necessary drainage channels were commenced and a contract was let for the electrically operated pumping plant.

(5) *Rajshahi Water-supply Extension Scheme.*—The works comprising installation of a second set of softening and iron elimination plant were started towards the end of the year and the works were in progress.

Contracts had been let for the additional pumping plant and for adding two more stages to the turbine type bore hole pumps in the two tube-wells.

(6) *Serampore waterworks completion scheme.*—Erection of low lift and high lift third pumping sets and laying of 8″ rising main in Dey Street was completed. Also a few additions and alterations were done to the distribution system in Mahesh ward from the savings of the scheme.

(7) *Asansol sewerage scheme.*—Repairs to main drainside slopes on 21″ sewer at outfall works were completed, cost being met from the savings of the scheme.

(8) *Dacca Waterworks Improvement IV.—Rising main from Narinda tube-well to Victoria Park reservoir.*—A tube-well with 6″ well pipe and 7″ strainer was sunk at Narinda in 1937 and was brought into operation in 1938. Arrangement was made to pump water direct into the adjoining street mains at 10,000 gallons per hour during supply hours of the town.

To get the full advantage of the tube-well it was proposed to lay a 8″ rising main from the tube-well to the Victoria Park reservoir, so that water could be stored in it by pumping during non-supply hours for use during supply hours. The bill of quantities and necessary drawings were prepared and materials were ordered early in the year but only a portion of the materials was receivd.

(9) *Dacca Waterworks Improvement IV-D, Part I.*—Contract drawings, etc., were prepared and tenders were accepted for some units including the filters and the elevated service reservoir.

Materials were also ordered for others but only a portion was received.

(10) *Narayanganj (West Bank) Water-supply Improvement Scheme, Part II.*—The complete scheme included the construction of a coagulation tank, an elevated reservoir, replacement of a few water mains in the town with bigger ones and the provision of a separate wash main to the filters from the filter wash water tank. All works excepting the last item estimated to cost Rs. 3,000 were complete in 1937.

Materials for this portion were received and tenders invited for laying the pipes.

(11) *Narayanganj (West Bank) Water-supply Improvement Scheme, Part III.*—The installation of the additional filter was completed.

(12) *South Chandpur New waterworks.*—The pumping station building with the filter shells, the machinery foundations, ground tanks and the major portion of the distribution system were completed.

The erection of the filter and the machinery was started.

(13) *Maijdi drainage scheme.*—All the works were completed, excepting the pumping machinery, which got damaged during the trial run.

(14) *Baranagar-Kamarhati Water-supply Scheme.*—The remaining works were all completed and water-supply maintained throughout the year.

6. **Expenditure on new works.**—The total capital expenditure on the waterworks and the sewerage works in the province during the year under review amounted to Rs. 2,33,943 and Rs. 1,17,961, respectively —*vide* Appendices I and II as against Rs. 7,39,270 and Rs. 99,647, respectively in the previous year.

7. **Maintenance of waterworks.**—The Kalimpong waterworks, Baranagar-Kamarhati Joint waterworks and Maijdi waterworks were maintained by the department as in previous years.

In order to ensure efficient maintenance of the Baranagar-Kamarhati waterworks during the initial period of its running and to educate the waterworks staff as to the proper method of running the different units of the plant, Government decided to keep this waterworks under the control of this department temporarily.

Applications for private house connections were received by both the municipalities who decided to have the municipal portions of the initial

house connections installed under the supervision of this department and for this purpose they deposited with the department the necessary funds to meet the cost of the connections, as per departmental estimates.

It may be mentioned in this connection that each house connection of this waterworks, which is designed on the principle of decentralised storage, is divided into two parts, viz., (1) everything inside the property line of the householder to be done by the householder, through the agency of the licensed plumbers, on the basis of approved plans, and (*ii*) the portion to be done in the public roads by the municipality and financed from the house connection fees.

8. **Waterworks inspection.**—As required by the rules regulating the management of sewerage and waterworks the following routine duties were carried on:—

(1) Checking of monthly returns of various sewerage and waterworks pumping stations of municipal authorities.

(2) Scrutinising the annual budget estimates of municipal sewerage and waterworks.

(3) Examination of the periodical inspection reports on the machinery and filters at the various municipal sewerage and waterworks pumping stations.

(4) *Scrutiny of the monthly reports on analysis of water.*—Cases of irregularities were brought to the notice of the municipal authorities concerned and necessary advice given.

(5) The quarterly returns of house connections in various municipalities and the annual abstracts of accounts of various municipal sewerage and waterworks depreciation funds were also scrutinised.

9. **The quality of drinking water.**—The quality of drinking water supplied from the various waterworks was on the whole satisfactory.

10. **Inspection of waterworks and sewerage works.**—The Executive Engineers inspected the various municipal waterworks and drainage works periodically as usual. Their reports were submitted to the Sanitary Board and forwarded to the local bodies concerned with the necessary recommendations.

The Assistant Engineer (Mechanical) and the Supervisor (Mechanical) also carried out their periodical inspections. As in the past several local bodies requisitioned their services in emergencies.

11. **Waterworks in operation.**—There were in all 52 municipal waterworks in operation in the province during the year under report, including the Kalimpong, Bagerhat, Munshiganj and Maijdi waterworks. The total number of persons served was 1,422,378 and the total quantity of filtered water supplied 19,131,793 gallons.

One of the Campbell Horizontal Oil Engines of the Midnapore waterworks was broken into pieces and the town supply was almost stopped. The Chairman requested me by wire to send the Assistant Engineer (Mechanical) of this department. The latter accordingly went there and made necessary arrangement for restoring the town supply.

The cross head of the pump at the Patuakhali waterworks was broken and in consequence the town supply was nearly stopped. At the request

of the Chairman the Supervisor (Mechanical) of this department was sent there and the necessary arrangement was made by him for a regular supply of water.

12. **Periodical inspection of municipal waterworks and sewerage machinery.**—Under the rules for the management of waterworks and sewerage works of municipalities in Bengal the commissioners are required to arrange for periodical inspection of pumping machinery by a qualified machinery inspector, or a firm of machinery inspectors. Owing to great increase in the number of municipal waterworks and sewerage works requiring such inspection and to the growing difficulty experienced in securing the services of engineering firms specialising in this class of work, proposals were submitted to Government for the creation of a mechanical division consisting of an Executive Engineer and necessary staff for carrying out regular inspections of the machinery and for ensuring their proper maintenance.

This work is of vital importance to urban water-supply in the province but it stands the risk of coming to a sudden standstill unless prompt measures are taken for the appointment of the necessary Government staff to carry out the inspections.

There have been of late frequent reports of partial breakdown of machinery in municipal waterworks but it has been found to be extremely difficult to cope with the exigencies of the situation with the existing small mechanical staff of this department. The frequency and the insistent nature of the requisition of the municipal authorities for the services of the mechanical staff of the department in matters like these are clear indications of its growing importance. This fact coupled with the necessity for this department to take over the periodical inspection of machinery points to the need for immediate enlargement of the existing mechanical staff of the department on a permanent basis.

13. **Practical training of student engineers and overseers.**—Two student engineers of the Bengal Engineering College joined this department in the previous year for practical training and they duly completed their courses of training during the year under report. Two new student engineers of the same college were taken in for training during the year.

Of the two student overseers from the Ahsanullah School of Engineering, Dacca, who joined this department in the previous year for practical training, one duly completed his training during the year while the other discontinued his training of his own accord shortly after he had joined.

Another student overseer of the same school joined this department this year for practical training for 12 months.

14. **Ganga Sagar Mela Water-supply.**—The arrangement of water-supply to the pilgrims attending the mela was done by this department at the request of the District Board, 24-Parganas, as in the previous years. Towards the end of the year, the district board expressed its willingness to take up the water-supply to the Mela to be held next year under its own control and sought the assistance and advice of this department, which were given.

15. **Miscellaneous inspections made and works done.**—(1) At the request of the Chairman of the Barrackpore municipality an officer of this department inspected that municipality in order to determine the

type of household septic tank latrines that would be most suitable to the municipality. A report was duly sent to the municipality making suitable recommendations.

(2) *Darjeeling Water-supply.*—The possibility of passing more water through the mains from Senchal to the reservoirs at St. Pauls and Rockville was under examination at the close of the year.

(3) At the request of the Superintendent of Police, Howrah, an officer of this department inspected the tube-well at Domjur police-station in the district of Howrah and advice was given as to how to sink a tube-well there.

(4) At the request of the Executive Engineer, Suburban Division, Communications and Works Department, the scheme for resinking the tube-well at the Barasat Sub-Jail compound was examined. Advice was given to fit an iron eliminator as mere resinking of the tube-well would not yield water containing less iron, and a copy of the pamphlet entitled "Iron Eliminators for hand pumped tube-wells" was sent.

(5) At the instance of the Superintending Engineer, Northern Circle, Communications and Works Department, the scheme for a septic tank and disposal gallery of the proposed new hospital in the Police Lines at Pabna was examined. As a project for a treatment plant to deal with whole of the sullage and night-soil for the Police Lines was under preparation, this design was not approved. It was, however, pointed out that a separate soak well would be necessary for disposal of the sullage containing disinfectants, etc., from surgical dressings, etc.

(6) At the request of the Executive Engineer, Communications and Works Department, Dacca Division, the arrangement for the disposal of the effluent from the water flush latrines to be constructed at Manipur for the Agricultural College was examined and necessary improvements suggested.

Advice was given to the same officer for the tube-well pumping plant for the Agricultural College.

(7) At the request of the Superintendent of Police, Dacca, inspection was made for selection of site for a tube-well at the Narsingdi police-station and necessary instructions were given.

(8) At the request of the Superintendent of Police, Dacca, the iron elimination plants installed at Gazaria, Munshiganj and Lalbag police-stations were inspected and advice given for their adjustment and improvement.

(9) At the request of the Magistrate, Chittagong, possibilities of enhanced supply at Sitakundu, the well known place of pilgrimage for the Hindus in the Chandranath Hills, was examined and necessary instructions were given.

16. **Rural Water-supply Subdivision.**—The activities of this subdivision had been strenuously directed towards assisting the local bodies in solving their problem of rural water-supply, which, under the Provincial autonomy, had come to occupy a very prominently important place in the programme of rural uplift and rural reconstruction for the province. The energies of the staff of this subdivision, which had been rather poorly limited to that of one Assistant Engineer and three

supervisors, had been mainly applied to works pertaining to water-supply—particularly domestic water-supply—summarised as below:—

(1) *Schemes for the rural water-supply programme for the Province.*—The most important works which this subdivision carried out during the year under review was the examination of the schemes for the rural water-supply programme for the province. These schemes, which had been drawn up by the district committees, were forwarded to this department for careful scrutiny and thorough check of the estimates prepared. On examination it was found that none of the schemes satisfied the principles enunciated and set forth in the Government circular No. 940-(5) P.H., dated 12th July 1939, and had been in most cases over-estimated as far as the number of supplies was concerned and under-estimated as far as the probable cost was concerned, and hence could not be accepted as comprehensive on a balanced basis. The schemes had, therefore, been drawn up again practically afresh by the rural water-supply subdivision under the revised instructions of the Government.

The different statement forms drawn up by the Mymensingh district board for a comprehensive scheme of the rural water-supply of the district were examined.

Out of 26 districts, schemes from 25 districts were received, of which schemes for 23 districts had been recast. For two districts, viz., Darjeeling and Jalpaiguri, the schemes were under various stages of examination. The scheme for one district, namely Rangpur district, was not received during the year under review.

(2) *Improvement of rural water-supply from Government of India grants and Provincial grant.*—The district schemes for the improvement of rural water-supply the cost of which was met from the Government of India Grants and the Provincial Grants were also examined by the rural water-supply subdivision.

(3) *Quarterly returns.*—Quarterly returns of the original and repair works relating to water-supply carried out by the district boards were examined.

(4) *Existing sources of supply.*—Particulars of the existing sources of supply were collected, examined for suitability of types of wells selected with reference to the water-bearing strata and quality of water obtained, according to local circumstances.

(5) *Hand pumps for tube-wells.*—Particulars regarding the different make of hand pumps in use were collected and examined with a view to suggest improvement eliminating defects, if any.

(6) *Specifications and estimates for wells.*—The specifications and estimates adopted by local bodies for tube-wells and other water-supply works were examined with a view to find out whether these conformed to those approved by this department.

(7) *Methods of execution.*—Methods actually adopted for the execution of works were carefully examined on the spot and instructions given for eliminating defects or for improvements.

(8) *Maintenance.*—The system of maintenance of the existing sources of water-supply as adopted by each of the individual local bodies was examined with a view to find out whether such maintenance had been adequate and economical.

(9) *Inspection.*—The Assistant Engineer and the supervisors of the subdivision in order to be able to function efficiently in the manner

aforesaid had to undertake extensive tours all over the province and kept on constantly advising the local bodies and their technical staff in matters relating to water-supply requiring expert guidance. The inspection reports were forwarded to the district boards for information and necessary action.

(10) *General.*—The subdivision has before it a wider scope of activities, and now that their duties and functions have been clearly defined and made known to all concerned, their services are getting more fully utilised by the local bodies and are earning increased recognition. As long as the Chief Engineer, Public Health Department, will function as the Inspector of Local Works, this subdivision will have to form an essential part and parcel of his staff. In this clear view of the matter, the subdivision may be made permanent without any further delay so that the members of the staff of this subdivision who are still included in the temporary establishment, may apply themselves to work with increasing efficiency in a more complacent mood.

The last but not the least is the problem of maintenance in an efficient and economical manner of all sources of water-supply which is slowly devolving on the district boards in a multiplied progression. It is plain that unless proper maintenance is arranged for, the capital outlay will not yield the expected result, and may go waste altogether. Experience has proved that in such matters effective Government control is indispensably necessary to secure an efficient running state of affairs. The rapid progress with which the improvement of rural water-supply is being affected suggests the creation of a water-supply division with immediate effect so as to be able to throw headlong into the matter from an early stage and gradually expand as the occasion demands with growing responsibility.

In short, examination of the rural water-supply programmes of the districts kept the staff of the rural water-supply subdivision fully occupied throughout the year and the prospect of a start being made with the execution of the scheme in the near future opens up a wide field of activities of the subdivision. Proposals put forward to Government for putting the subdivision on a permanent footing merit careful consideration and in the interest of public service the sooner this is done the better.

17. **Fees realised.**—The total amount of receipts of the department during the year under report was Rs. 35,628 as detailed below:—

	Rs.	a.	p.
(1) Fees for preparation of schemes	17,575	5	0
(2) Fees for supervision of construction	7,681	8	0
(3) Miscellaneous	205	1	0
(4) Balance of local contribution and Government of India Up Lift Grant for Rangamati Water Supply Extension Scheme credited to revenue as per Government Order No. 3487E., dated 26th March 1941	10,165	11	0
Total ..	35,627	9	0
say	35,628	0	0

S. N. GHOSE, B.A. (Cal.), B.SC. (Glas.), M. INST. C.E., F.R. San. I., M.I.E. (Ind.),
Chief Engineer,
Public Health Department, Bengal.

CALCUTTA,
The 31st May 1941.

Appendices.

APPENDIX

Statistics with regard to Municipal

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population, in gallons.	Total capital expenditure during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
1	Burdwan ..	1884 1st extension in 1926.	3·30	703,080 gallons daily.	39,201	454,358	11·59	1,724
2	Mymensingh ..	1893 1st and 2nd extensions in 1922 and 1937 respectively.	2·50	400,000 gallons per day in 8 hours.	30,480	499,649	16·39	481

I.

Waterworks in Bengal, 1940.

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
5,91,074	26,147	2·52	River Banka ..	Five slow sand filter beds.	Two Tangye's horizontal crude oil cold starting engines, rated 77 B. H. P.; 28" single stage low lift type Tangye's centrifugal pumps direct belt driven, capacity of each 52,000 gallons per hour, average total lift 39'. Two Tangye's triplex single acting horizontal plunger pumps. The shaft is coupled direct to the engine by a friction clutch and the pumps are driven through a single reduction, helical gearing. Capacity of each pump 47,000 gallons per hour. Average total lift 96·34'. One Tangye's "AA" type oil engine 2¾ B. H. P. single cylinder for workshops. One Lancashire boiler and one horizontal compound Worthington condensing pumping engine.
6,44,568	23,259	2·04	River Brahmaputra.	Five slow sand filter beds and two Paterson's rapid gravity type filters. Normal capacity of each filter per hour 12,500 gallons.	Riverside pumping station— (*i*) Two numbers Harland 7" spiroglide vertical single stage split casing centrifugal pumps drvien by 2 Nos. 10B. H. P. Harland E type drip proof vertical spindle continuously rated compound wound interpolar 440 volt × 37·4 amp. 1,000/1,450 R. P. M. D. C. motors, each set having a capacity of 51,480 G. P. H. against a total head of 55 feet at a pump speed of 1,400 R. P. M. High Lift station— (*ii*) Two numbers Harland 6" spiroglide horizontal single stage centrifugal pumps driven by 2 Nos. 36 B. H. P. Harland E type drip proof continously rated compound wound interpolar 440 volts C. 69·25 amp. 1,450-1,700 R. P. M. D. C. motor. Each set having a capacity of 50,000 gallons per hour agaisnst a total head of 105 feet at a pump speed of 1,650 R. P. M. Standby plant— (*iii*) One triple expansion horizontal Worthington Duplex high and low lift combined steam pumping engine, steamed off a Babcock and Wilcox water tube boiler.

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population. in gallons.	Total capital expenditure during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
3	Howrah ..	1896	10·10	..	224,873	4,202,812	18·69	5,180
4	Berhampore ..	1899	6·00	612,000 gallons daily.	27,403	330,131	12·04	3,600
5	South Suburban ..	1904	3·70	..	24,000	74,161	3·09	254
6	Garulia ..	1904	1·50	..	14,000	256,000	18·28	..
7	Tittagarh ..	1905	1·50	..	49,584	1,745,966	35·21	..
8	Narainganj (west bank of the river).	1908 1st and 2nd extensions in 1935 and 1937 respectively.	3·00	445,000 gallons daily in 18 hours (capacity limited by storage in elevated tanks).	24,487	524,043	21·40	23,567
9	Tollygunge ..	1909	5·15	..	32,000	210,007	6·56	345
10	Champdany ..	1909	1·65	..	25,365	395,746	15·60	..

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges.)	Cost of delivery of 1,000 gallons (exclusive. of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
44,49,860	1,95,988	2·04	River Hooghly	Ten slow sand filter beds.	For unfiltered water—Two vertical high speed uniflow engines direct coupled with two 20″ Worthington low lift centrifugal pumps. Average total head—3 feet. For filtered water—One Worthington vertical triple expansion flywheel triplex pumping engine. One Worthington horizontal triple expansion Duplex pumping engine. Two horizontal compound condensing Duplex pumping engines by Evans and Dean. Average total head 92′. Five Lancashire boilers.
4,33,109	22,970	3·05	River Bhagirathi	Two slow sand filter beds.	Filtered water pumping station—Two horizontal single cylinder Blackstone spring injection crude oil engines, each of 34 B. H. P. at 375 R. P. M. Two Gwynnes invincible single stage centrifugal pumps; size 5 inches. Unfiltered water pumping station.—In a barge. One Tangye's semi-diesel crude oil engine, 24 B. H. P. One Tangye's centrifugal pump and one Crossley 24 B. H. P. horizontal semi-diesel crude oil engine. One Mather and Platt's centrifugal pump. All the pumps are direct belt driven from the engines. Average total lift 55 feet.
67,454	754	0·44	Calcutta Corporation Water Works.	....	
15,247	46	·007	Supplied from local mills and 20 tubewells.	....	....
17,929	..	..	Local mills ..	....	....
4,73,751	21,552	1·80	River Sitalakhya.	One Jewell gravity filter.	Two Loco type boilers N. H. P. 12, duplicate sets of Worthington horizontal triple expansion, surface condensing, combined high and low lift pumping engines, average total lift 140 feet.
97,885	21,828	4·56	Calcutta Corporation Waterworks and municipal tubewells.	....	....
51,023	2,079	0·23	Local jute mills and 5″ dia. tubewell (municipal).	....	....

No.	Name of municipality.	Year of comple-tion.	Area served.	Designed capacity of works.	Approxi-mate popula-tion served.	Average daily supply in gallons.	Average daily supply per head of popula-tion. in gallons.	Total capital expendi-ture during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
11	Dacca ..	1910 1st, 2nd, 3rd and 4th exten-sions in 1921, 1929, 1935 and 1937, respec-tively.	7·00	2,400,000 gallons per day in 24 hours (capa-city limited by pump deli-very).	138,518	2,474,601	17·86	15,698
12	Munshiganj ..	1911	1·00	Designed to supply 2,500 gallons per hour but can now supply 10,800 gallons per day for 9 hours owing to the suction due to the forma-tion of a char.	4,500	11,030	2·45	..
13	Barisal ..	1912 1st and 2nd exten-sions in 1932 and 1935, respec-tively.	4·75	680,400 gallons daily.	35,716	189,536	5·30	875

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges.)	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
18,58,543	61,720	1·09	River Buriganga.	Six Jewel gravity filters and two Paterson gravity filters.	Two sets of horizontal Worthington triple expansion, combined high and low lift pumping engines. Average total lift 74·5 ft. Two Babcock and Wilcox water-tube boilers, N. H. P. 76, fitted in the superheater, Green's economiser, working pressure 160 lbs. Nalgola unfiltered water pumping station— One 7" Sunturbo medium lift vertical spindle centrifugal pump driven by a Metropolitan Vickers 25 B. H. P. 440 volts. shunt wound vertical spindle motor, capable of delivering 900 G. P. M. against a total head of 58 feet with a pump speed of 1,450 R. P. M.
42,289	2,436	9·68	Dhaleswari river in dry season and Munshigunge Khal in rainy season.	Two Jewell pressure filters.	Two horizontal Worthington Duplex piston pattern non-condensing pumping engines; Two vertical cross tube-boilers N. H. P. 5, average total lift 74 feet. (One boiler has since been scrapped.) One 6 B. H. P. Petter's type crude oil engine speed 725 R. P. M. driving a 2½" centrifugal pump through a belt.
3,50,111	12,763	2·95	Barisal river ..	Three slow sand filters.	One old Worthington tandem compound, surface condensing, horizontal double acting, combined high and low lift pumping engines. Average total lift 86·7 ft. Two loco-type boilers, kept as standby. Low Lift— Two Mather and Platt's 5" single stage split casing type centrifugal pumps, capacity of each 16,500 gallons per hour against 45 feet total head direct coupled to two Siemen's—Schuckert A.C.3 phase 400 volts. 50 cycles squirrel cage induction motors 7·5 H.P., R.P.M. 1,420. High Lift— Two Worthington split casing type 4" single stage centrifugal pumps, capacity of each 15,000 gallons per hour against 78' total head, direct coupled to two Siemens— Schuckert A. C. 3 phase 400 volts, 50 cycles, squirrel cage induction motors 12 H. P., R. P. M. 1,430.

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population. in gallons.	Total capital expenditure. during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
14	Chandpur (Southern Section).	1912	0·09	24,000 gallons per day in 9 hours (can work 10 hours).	6,500	27,063	4·16	21,338
15	Darjeeling ..	1912	4·85	Depends on rainfall.	23,000	731,123	31·78	34,964
16	Perojpur ..	1913	0·50	..	2,300	3,200	1·39	505
17	Kurseong ..	1913	2·00	Depends on rainfall.	7,451	150,000	20·13	..
18	Hooghly-Chinsura	1914 1st extension in 1933.	5·00	775,800 gallons daily.	32,634	628,368	19·25	5,071
19	Jessore ..	1914	4·00	112,000 gallons in 16 hours.	9,000	45,063	5·00	..

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges.)	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
82,902	3,591	5·82	River Meghna	Two Jewell pressure filters.	Two horizontal Worthington piston pattern non-condensing pumping engines. Two vertical cross tube-boilers N. H. P. 5, average total lift 74′—0″.
10,01,039	14,833	0·89	30 springs on Senchal spur.	Nil ..	For subsidiary service to St. Paul's School and three adjacent properties, two 10 H. P. motors, one Rees Roturbo pump and one Hayward Taylor duplicate plunger pump. Pumping plant at "Konkhola." One Rustom Hornsby horizontal 4 cycle semi-diesel crude oil engine B. H. P. 66. One worthington vertical single acting triplex ram pump, direct belt driven.
23,977	505	6·91	Reserved tank	Two slow sand filters.	Two kite motion hand pumps.
1,28,777	4,319	1·26	Springs in the forest of Sepoydhora and Dow hill.	Three Jewell pressure filters.	Gravity supply.
8,23,908	25,390	1·77	River Hooghly	Four slow sand filter beds.	Two Deutz 4 stroke, 6 cylinder full diesel engines, 130/150 B. H. P. 375 R. P. M. Low lift from river to settling tanks. Two Amag Hilpert single stage centrifugal pumps, capacity 1,250 gals. per min. Total head 46·5′. High lift. Two Amag Hilpert two stage centrifugal pumps, capacity 1,000 gals. per min. Total head 204 ft. All the pumps are belt driven.
2,09,914	6,399	6·22	Reserved tank and tube well.	Three Paterson gravity filters.	Two Crossley vertical 4 stroke 5 B. H. P. crude oil engines direct coupled to two Worthington horizontal 2½″ centrifugal pumps for high lift capacity of each 8,000 gallons per hour against 64 ft., head, R. P. M. 1,400. One Crossley vertical 4 stroke, 5 B. H. P. crude oil engine and one Tangye 4″ centrifugal pump. Average total lift 47·5 feet. All the pumps are direct belt driven. One Broom and Wade's air compressor for filter washing. This is driven by L.L. engine through a countershaft.

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population in gallons.	Total capital expenditure during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
20	Khulna ..	1914 1st and 2nd extensions in 1929 and 1937, respectively.	3·75	200,000 gallons in 16 hours.	18,000	115,019	6·39	1,371
21	Bankura ..	1916 1st extension in 1926.	3·50	192,000 gallons daily.	31,703	244,402	7·71	508

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges.)	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
1,82,468	13,440	5·12	Reserved tank and river.	One Paterson gravity filter, size 12′×10′, capacity 7,500 gallons per hour.	Main Station— (a) Two Blackstone single cylinder spring injection cold starting crude oil engines each of 9 B. H. P., 4 stroke type, cylinder diameter 6″×12″ stroke running at 300 R. P. M. These are kept as standby. (b) Two G. E. C. "Witton" induction motor 400 volts 15 Amp. R. P. M. 1,450, 3 phase 50 cycles 10 H. P. Each working one medium and one H. L. pump through a countershaft and belts. (c) Two H. L. Gwynnes M. type single stage centrifugal pumps, capacity 7,500 gallons each per hour, against a total head of 65·6 ft. (total suction and delivery head) running at 1,500 R. P. M. (d) Two medium lift "M" type Gwynnes single stage centrifugal pumps running at 1,100 R. P. M. River side engine— (e) Motor—One G. E. C. "Witton" induction motor 3 B. H. P. 400 volts, 8 Amp. R. P. M. 1,425, 50 cycles. 3 phase, direct coupled to one L. lift Worthington centrifugal pump single stage R. P. M. 1,425. Capacity 13,000 gallons per hour under a head of 33·8 ft.
1,56,651	7,768	1·39	Rivers Gandheswari and Darakeswar.	Two infiltration galleries in the bed of river Gandheswari and tube-well in the river Darakeswar.	Gandheswari Station— One Medaag Krupp vertical single cylinder two stroke diesel engine of 25 B. H. P. One Klein Schanzlin and Backer centrifugal pump, direct coupled to the engine through a gear box ; capacity of pump per hour 12,000 gallons against a head of 115 feet. Darakeswar Station— One Lister vertical, twin cylinder 4 stroke, 14 B. H. P. diesel engine R. P.M. 1,000 driving a centrifugal pump of Pulsometer Co., capacity 200 gallons per minute against a total head of 153 feet at 1,650 R. P. M. One Madaag Khrupp vertical single cylinder two stroke diesel engine of 30 B. H. P. and one Klein Schanzlin and Backer centrifugal pump coupled through a gear box. Capacity 15,000 gallons per hour. Total head 127 feet.

No.	Name of municipality.	Year of completion.	Area served	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population in gallons.	Total capital expenditure during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
22	Chittagong ..	1916	5·37	576,000 gallons in 16 hours, supply varies with the condition of bore holes which gradually choke up due to deposit of iron salts and require cleaning up occasionally.	52,623	492,678	9·36	4,076
23	Uttarpara ..	1918	0·75	..	10,000	120,139	12·01	55
24	Nator ..	1919	2·50	48,000 gallons in 16 hours.	8,000	18,104	2·26	..
25	Rajbari ..	1919	0·76	24,000 gallons in 16 hours.	3,500	9,900	2·82	148
26	Satkhira ..	1919 1st extension in 1930.	3·00	24,000 gallons daily.	7,500	18,800	2·50	..
27	Noakhali ..	1920	0·75	12,120 gallons in 6 hours, can work longer.	6,050	19,518	3·22	105
28	Kalimpong ..	1922	1·50	..	8,792	178,250	20·27	..

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
4,20,953	44,103	3·92	Three bore holes	Paterson's iron elimination plant by lime and two gravity filters.	Two horizontal triple expansion surface condensing fly wheel steam engines driving direct two double acting plunger pumps for high lift and air compressor for low lift. Two Lancashire boilers. Average total lift 104′ 0″.
1,95,444	9,485	3·46	River Hooghly	One Paterson's gravity filter.	One electric motor and two sets of Tangye's centrifugal pumps, consisting of three in each set, driven by two Tangye's patent semi-diesel crude oil engines. Countershaft belt driven. Average total lift 63·7′.
1,18,603	3,913	9·47	Reserved tank and tube-well.	One Jewell pressure filter.	Two Petter's single cylinder two stroke vertical semi-diesel crude oil engines. Each of 6 B. H. P. Two Evan's horizontal double acting power pumps, capacity of each pump per hour 3,000 gallons, Direct belt driven. Average total lift 65 beet.
65,751	2,748	12·16	Two deep seated tube-wells.	One Jewell pressure filter.	One 6 B. H. P. and one 3 B. H. P. Petter's two-cycle vertical kerosine oil engines. Two "A" type double acting horizontal Worthington single power pumps, capacity 1,500 gallons per hour. Direct belt driven. Average total lift 55′.
90,672	1,734	4·04	Reserved tank	One Mather and Platt's mechanical pressure filter.	Mather and Platt's turbine centrifugal pump of 4,000 gallons per hour capacity, average total lift 70·7′, countershaft belt driven by two Campbell's crude oil engines of 9 B. H. P. each; one chemical pump plunger type, for pumping coagulant.
44,164	3,211	7·21	Reserved tank	No filter, chlorinating apparatus only.	One vertical boiler and one Worthington Duplex non-condensing pumping engine.
8,16,904	11,147	2·74	Springs of river Rilli.	Nil ..	Gravity supply.

No.	Name of municipality.	Year of completion.	Area served	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population in gallons.	Total capital expenditure during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
29	Krishnagar ..	1922 1st extension in 1926.	7·50	..	24,000	332,410	13·85	11,825
30	Comilla ..	1925	2·58	Designed for 200,000 gallons in 16 hours (limited to 140,000 gallons per day in 24 hours until a 3rd tube-well is sunk).	31,365	160,893	5·13	—697
31	Bhadreswar ..	1926	1·90	..	22,992	290,794	12·64	..
32	Midnapore ..	1926 1st extension in 1928.	4·00	350,000 gallons in 10 hours.	32,021	499,969	15·61	217

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery. of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
4,43,790	9,927	1·30	River Julangi	Two Jewell mechanical gravity filters.	These are kept as standby, one Blackstone, crude oil engine of 15 B. H. P. one Ransomes, Sims and Jefferies semi-diesel engines, 15 B. H. P. Two Ransomes, Sims and Jefferies semi-diesel engine, 10 B. H. P each. Two Worthington 2½" high lift centrifugal pumps. Two Worthington 3" medium lift pumps and one 6" Worthington low lift centrifugal pump. All direct belt driven. Total average lift 43·9". High lift— Two sets of Worthington split casing type centrifugal pump. Capacity 24,000 gallons per hour. Direct coupled to Crompton Parkinson's 440 volts, 3 phase, 50 cycles, R. P. M. 1,440, induction motors of 10 B. H. P. each. Medium lift— Two sets of centrifugal pump of 24,000 gallons per hour direct coupled to induction motors of 7·5 B. H. P. and 1,430 R. P. M. River side L. L.— One centrifugal pump of 33,000 G. P. H. capacity direct couple to induction motor of 1,450 R. P. M. and 10 B. H. P. motors and centrifugal pumps of both M. L. and L. L. are exactly like those of H. L. sets.
5,21,711	11,767	3·20	Tube-wells ..	One Paterson pressure filter.	Two 9½ B. H. P. high compression type Campbell crude oil engines, one 10 B. H. P. high compression cold starting Campbell crude oil engine. Three Worthington triplex ram pumps, direct belt driven. Average total lift 93·4 feet.
..	..	..	From local mills and tube-wells.	....	....
5,96,213	21,224	1·86	Two wells in the bed of river Cossye with auxiliary tube-wells.	Nil	Two 42 B. H. P. Campbell horizontal crude oil engines driving two vertical treble ram pumps. Direct belt driven. Average total lift 135'.

No.	Name of municipality.	Year of comple-tion.	Area served	Designed capacity of works.	Approxi-mate popula-tion. served.	Average daily supply in gallons.	Average daily supply per head of popula-tion. in gallons.	Total capital expendi-ture during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
33	Raniganj ..	1927	1·85	150,000 gallons in 12 hours.	16,373	158,230	9·66	227
34	Suri	1927	3·15	..	10,900	102,353	9·39	277
35	Naihati ..	1928 including 1st extension.	1·68	..	30,908	301,455	9·75	846
36	Faridpur ..	1929 1st extension in 1936.	5·00	75,000 gallons per day in 8 hours.	15,000	100,814	6·72	1,722
37	Patuakhali ..	1929	2·00	15,500 gallons per day.	5,000	13,281	2·65	936
38	Asansol ..	1930	4·04	264,000 gallons in 12 hours.	25,312	278,191	10·99	2,613

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
3,41,862	11,740	3·25	Damodar river	Nil	Two Campbell high compression crude oil engines of the horizontal single cylinder ordinary cold starting type 23—26 B. H. P. each. Two Campbell vertical treble ram water pumps, capacity 12,500 gallons per hour each. Direct belt driven. Average total lift 174·5′.
2,41,183	7,722	3·30	Infiltration gallery in the bed of the river Mourakhy.	Nil	Two three-throw ram pumps of 7,500 gallons capacity each direct belt driven by two 15 B. H. P. Campbell high compression horizontal heavy oil engines. Average total lift 185·7′.
2,35,014	4,482	0·65	Supplied from local mills.	....	....
2,02,526	9,189	3·99	Tube-well ..	Iron elimination plant and jewell gravity filter.	High Lift— Two A. E. G's 3 phase A. C. motors, 400-440 volts. 7·8/7·1 amps, 55 H. P., 50 cycle R. P. M. 2,860, direct coupled with A. E. G's centrifugal pumps, capacity 8,000 gallons against a total head of 70 ft. Low Lift pumps— Two A. E. G's 3 phase A. C. motors 6·5 H. P. 400-440 volts 9 5/8·6 amps. 50 cycle R. P. M. 1,425 direct coupled to A. E.-G's centrifugal pumps capacity 10,500 gallons against a total head of 50 ft. R. P. M. 1,440. Lime plant—Driven by Siemens motor 3 H. P., 400 volts, 4·8 amps. 50 cycle R. P. M. 1,420.
1,35,946	3,794	12·52	Reserved tank	One Kennicot pressure filter.	Two Evan's power pumps. Two 3 B. H. P. Petter's vertical kerosine oil engines. Direct belt driven. Pumping capacity of the pump is 300 gallons per hour. Average total lift 46′. Kept as standby. Ercole Manille and C. S. A. Milanee Motor one is 440 volts, A 6·95, 4 H. P. motor 2,800 R. P. M. and the other is 440 volts, 4·8 amp, 2·2 H. P. motor made in Italy. Pumps are direct coupled single stage 1¼″ centrifugal pumps capacity 53·3/31·6 gallons per minute against total head of 53/75 ft. R. P. M. 2,850 mounted on common bed plate.
5,00,392	18,774	2·95	Infiltration gallery in the bed of the river Damodar with auxiliary tube-well.	Nil	Two General Electric "Witton frame" enclosed ventilated type slip ring induction electric motors of 49 B. H. P. each, 400 volts A. C., direct coupled with two Sulzer high lift centrifugal pumps. Capacity 22,000 gallons per hour each. Average total lift 270′.

No.	Name of municipality.	Year of comple-tion.	Area served	Designed capacity of works.	Approxi-mate popula-tion. served.	Average daily supply in gallons.	Average daily supply per head of popula-tion. in gallons.	Total capital expendi-ture during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
39	Nabadwip ..	1931	1·50	..	18,861	27,945	1·48	4,156
40	Bansberia ..	1931	3·10	..	8,000	111,156	13·89	210
41	English Bazar ..	1932	1·50	112,000 gallons per day in 8 hours (can run 16 hours.)	11,000	82,216	7·47	..
42	Bhatpara ..	1932	5·00	..	80,000	1,021,924	12·77	1,233
43	Narainganj (East Bank).	1932	1·50	161,000 gallons in 12½ hours (capacity limited by elevated storage tank).	9,700	99,529	10·26	3,566
44	Chandpur (Northern Section).	1932	0·36	140,000 gallons per day in 14 hours (capacity limited by storage in elevated tank).	7,250	69,734	9·61	2,422
45	Jalpaiguri ..	1934 1st extension in 1936.	3·06	112,000 gallons per day in 8 hours (can run 16 hours).	17,860	95,829	5·36	274

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
50,476	1,487	2·33	Two tube-wells	....	....
1,03,475	4,002	1·57	Supplied from local mills.	....	....
1,03,791	6,005	3·20	Two tube-wells	....	Two 24 B. H. P. Crossley four cycle horizontal cold starting crude oil engines. Two high lift Worthington centrifugal split casing pumps, capacity 14,000 gallons per hour against a total head of 110 feet. Two Worthington horizontal double acting air compressors, size 7½"×6" stroke, for air lift from the tube-wells. All direct belt driven.
2,61,013	..	..	Local mills (tube-wells and the river Hooghly).	....	....
2,23,077	5,823	2·56	Tube-wells ..	Iron and manganese elimination plant and one Paterson filter.	Two Ruston and Hornby cold starting semi-diesel 4 cycle-horizontal type crude oil engines rated 22 B. H. P. Three Harland low lift. centrifugal pumps, capacity 6,500 gallons per hour against 60 feet total head. Two Harland high lift centrifugal pumps, capacity 13,000 gallons per hour against total head 78 feet. All belt driven through a countershift.
1,88,358	5,537	3·48	River Dakatia	Two Jewell gravity filters.	Two 24 B. H. P. Crossley horizontal 4 cycle cold starting crude oil engines. Four Mather and Platt split casing type centrifugal pumps for low lift capacity 10,000 gallons per hour against a total head of 31 feet. Two Mather and Platt centrifugal pumps for high lift capacity 10,000 gallons per hour against a head of 49 feet. All belt driven through a countershaft.
1,12,018	9,311	4·25	Two 5" dia. tube-wells.	Two upward flow gravel filters.	Two sets of centrifugal pumps direct coupled to 440 volts A. C. induction motors. Capacity of each pump 7,500 gallons per hour. These sets pump water from tube-wells to iron eliminating plant. One set centrifugal pump same as above used as high lift and also two sets of centrifugal pumps direct coupled to 440 volts A. C. 14¾ B. H. P. induction motor capacity of each pump 14,000 gallons per hour, head 90 feet.

No.	Name of municipality.	Year of comple- tion.	Area served	Designed capacity of works.	Approxi- mate popula- tion. served.	Avesage daily supply in gallons.	Average daily supply per head of popula- tion. in gallons.	Total capital expendi- ture during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
46	Kalna ..	..	0·80	..	5,500	41,000	7·45	1,833
47	Serampore ..	1936	1·62	512 000 gallons in 16 hours.	39,056	5,49,164	14·06	39,464
48	Rangamati ..	1936	0·12	14,000 gallons per day in 14 hours (capacity limited by stor- age in street tanks).	2,000	16,566	8·28	118
49	Bagerhat ..	1937	3·00	..	3,500	21,022	6·00	..

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery. of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
33,453	2,035	2·17	One 5" and one 4" dia. tube-well.	....	....
6,31,653	19,750	1·57	River Hooghly	Two Paterson's rapid gravity type filters complete with air wash plant and chloronome.	Unfiltered station— (*i*) Two 5" Gywnnes centrifugal "KL" pumps for low lift direct coupled to "Asea' 12 H. P., 400 volts 3 phase 50 cycle induction motors running at 1,440 R. P. M. Each set capable of delivering 33,500 gallons of water per hour against a total head of 47 ft. Filtered station— (*ii*) Two 5" Gwynnes centrifugal "K" pumps for high lift direct coupled to two "Asea" 30 H. P., 400 volts 3 phase 50 cycle induction motors, running at 1,440 R. P. M. Each set capable of delivering 32,000 gallons of water per hour against a total gauge head of 129 ft. Transformer—(*iii*) One "Asea" 3 phase, oil immersed, self-cooled, Core type transformer, rated 100 K. V. A. at 50 cycles and designed for a voltage ratio of 6,000/400 volts at full load.
42,339	5,626	14·89	River Kharnafuly.	One 42" diameter × 4' 6" steel jewell pressure filter, capacity 1,000 gallons per hour.	Two Deutz full diesel 10 B. H. P. horizontal engines direct coupled to Siemens-Schuckert Generators of 5 K. W. and 230 volts. One Siemens-Schuckert 2 B. H. P. motor direct coupled to Amagh-Hilpert, 4 stage centrifugal pumps, capacity 1,000 gallons per hour Head 120 feet. Speed 1,410 R. P. M.
56,681	3,460	7·21	Two 5" dia. tube-wells.	One iron elimination plant, capacity 5,000 gallons per hour and one Water softening plant of the same capacity.	Two Petters 10 B. H. P. 800 R. P. M. crude oil engines High Lift— Two Mather and Platt 2"/3" medivane split casing centrifugal pumps, capacity 5,000 gallons per hour against 55 feet head from all causes, R. P. M. 1,100. Low Lift— Two Mather and Platt 2"/3" medivane split casing centrifugal pumps, capacity 2,500 gallons per hour against a total head of 45 feet, R. P. M. 1,050.

No.	Name of municipality.	Year of completion.	Area served	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population in gallons.	Total capital expenditure during 1940.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
50	Rajshahi ..	1937 including 1st extension.	1·25	..	18,000	81,931	4·55	2,931
51	Maijdi ..	1937	0·17	1,250 gallons per hour for 8 hours.	600	5,720	9·53	−383
52	Baranagore-Kamarhati.	1939	10·00	..	90,000	500,000	5·50	32,340
53	Garden Reach (in progress).	..	..	..	..	..	..	7,948
	Total ..	..	..	..	1,422,378	19,131,793	..	2,33,943

Total capital expenditure up to 1940.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
1,19,179	12,212	6·53	Two tube-wells each 7" dia.	Two water softening plants—capacity 8,000 gallons per hour each.	High Lift— Two 4"/3" Worthington centrifugal pumps direct coupled to 10 B. H. P., 460 volts D. C. motor, R. P. M. 1,440, capacity 11,000 gallons per hour each against a total head of 80 feet. Low Lift— Two vertical spindle deep well turbine 7" pumps direct coupled to 10 B. P. H. 460 volts vertical spindle D. C. motor. R. P. M. 1,750. Capacity 11,000 gallons per hour each against a total head of 55 feet. Supply taken from Noakhali municipal pumping plant.
25,995	1,718	13·16	Reserved tank	One 48" diameter Jewell pressure filter, capacity 1,250 gallons per hour.	Two Lister single cylinder 6 B. H. P. vertical 4 cycle crude oil engines. R. P. M. 600. Two 2"/1½" Worthington uniflow split casing centrifugal pumps. Capacity of each 1,250 gallons per hour against a total head of 60 feet at 1,400 R. P. M.
7,40,610	19,208	1·70	River Hooghly	3 Nos, Paterson gravity filters size—13′ × 25′ capacity 22,250 gallons per hour each.	River side station.— One Pulsometer vertical spindle Axial flow propeller pump output 120,000 G. P. H. against total head of 12 ft. direct coupled to vertical spindle squirrel cage 3-phase 50 cycle, 400 volts, 13 H. P. A. C. motor. Low Lift pumping sets.— 3 Nos. Pulsometer type horizontal single stage 6" centrifugal pump. Each capable of pumping 33,500 G. P. M. against total head of 41 ft. direct coupled to squirrel cage 3-phase, 50 cycles, 400 volts, 11 H.P. A.C. motors. High Lift station.— 3 Nos. Pulsometer type horizontal single stage 5" centrifugal pump capacity 33,500 G. P. H. each against total head of 90 ft. direct coupled to squirrel cage 3-phase, 50 cycles, 400 volts, 25 H. P. A. C. motors. Transformer.— One double wound core, oil immersed self-cooled transformer capacity 100 KVA when operating on 3-phase 50 cycle supply and having a voltage ratio of 6,000/400 volts.
2,44,511	..	..	..	..	
1,96,10,236					

APPENDIX II.

Total expenditure on drainage and sewerage works in the municipalities in Bengal up to 31st December 1940.

No.	Name of municipality.	Area served.	Approximate population served.	Total capital expenditure during the year 1940.	Total capital cost up to 31st December 1940.	Annual cost of maintenance.
1	2	3	4	5	6	7
		Sq. miles.		Rs.	Rs.	Rs.
1	Asansol	..	..	3,409	1,27,751	1,402
2	Bagerhat	..	..	..	257	..
3	Baukura	0·08	7,500	1,053	15,078	3,774
4	Baranagar	2·10	37,000	5,891	98,033	5,003
5	Baraset	3·50	5,500	..	24,809	304
6	Baruipur	3·50	6,483	..	17,368	607
7	Basirhat	8·50	21,287	685	24,678	685
8	Berhampore	6·00	27,403	411	69,231	9,085
9	Bhadreswar ..	0·62	15,600	995	34,742	1,940
10	Bhatpara	5·00	80,000	10,736	17,35,778	26,104
11	Budge Budge ..	2·00	5,612	477	1,00,356	1,790
12	Burdwan	4·00	28,000	1,817	1,97,936	704
13	Champdani ..	2·00	20,000	3,927	2,66,048	3,048
14	Chandpur (South) ..	0·05	3,000	39	1,993	812
15	Chandpur (North) ..	0·05	1,300	..	713	72
16	Dacca	4·00	1,10,000	18,143	26,11,326	45,192
17	Darjeeling	4·85	23,000	10,209	2,14,970	23,930
18	English Bazar ..	2·00	11,000	548	35,731	1,530
19	Garulia	1·50	14,000	703	55,055	1,762
20	Howrah	3·88	1,29,131	34,720	15,66,523	49,546
21	Jangipur	3·00	12,000	..	47,322	54
22	Kalimpong and Bazar ..	..	..	..	64,013	..
23	Katwa	1·00	7,909	131	57,608	1,459
24	Khulna	3·00	15,500	6,678	32,472	2,634
25	Krishnagar	1·50	10,000	1,879	44,603	1,080
26	Kurseong	2·00	6,000	..	2,56,482	633
27	Kushtia	0·55	5,000	155	38,413	1,694
28	Maijdi	..	..	4,338	32,698	..
29	Narayanganj (West Bank)	3·00	24,000	489	9,697	3,756
30	Narayanganj (East Bank)	1·50	10,000	129	554	505
31	Patuakhali	2·00	5,000	..	..	307
32	Ranaghat	2·00	11,395	1,985	56,499	2,194
33	Rangpur	..	..	..	93,114	3,112
34	Rajshahi	1·25	15,000	732	2,430	2,555
35	Satkhira	0·25	2,000	91	91	..
36	Serampore	1·00	15,000	5,300	52,480	..
37	Suri	2·00	7,500	504	51,008	1,732
38	Tangail	0·19	3,000	375	24,768	375
39	Tittagarh	1·50	49,584	1,066	13,03,381	43,201
40	Uttarpara (in progress)	0·75	12,500	355	45,511	1,915
	Total ..	..	7,57,204	1,17,961	94,11,530	..

B. G. Press—1941-42—4009D—522.

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